What is Claimed is:

1. A composite material comprising a matrix phase having a nanostructured carbon binder phase derived from a carbon binder mixture comprising mixed fullerenes interspersed throughout the matrix phase.

2. The composite material of Claim 1, wherein the nanostructured carbon binder phase is derived from pressure-sintered mixed fullerenes.

3. The composite material of Claim 2, wherein the mixed fullerenes are extracted from soot.

4. The composite material of Claim 1, wherein the nanostructured carbon binder phase comprises a structure that exhibits a hardness of at least 4 on the Mohs scale, and a density of at least 1.6 g/cm^3.

5. The composite material of Claim 4, wherein said nanostructured carbon binder phase exhibits a resilience measuring at least 2% strain to fracture.

6. The composite material of Claim 1, wherein the nanostructured carbon binder phase is derived from a pressure-sintered mixture of fullerenes and organic compounds.

7. The composite material of Claim 6, wherein the organic compounds are aromatic hydrocarbons.

8. The composite material of Claim 7, wherein said aromatic hydrocarbons are selected from the group consisting of coal-tar pitch, petroleum pitch, anthracene, naphthalene, and mixtures thereof.

9. The composite material of Claim 1, wherein the matrix phase is composed of a metal.

10. The composite material of Claim 9, wherein the metal is selected from the group consisting of iron, nickel, cobalt, titanium, aluminum, beryllium, copper, silver, gold, platinum, tungsten, molybdenum, uranium, and alloys thereof.

11. The composite material of Claim 1, wherein the matrix phase is composed of a ceramic.

12. The composite material of Claim 11, wherein the ceramic is selected from the group consisting of carbides, borides, nitrides, silicides, oxides, and mixtures thereof.

13. The composite material of Claim 1, wherein the matrix phase is a carbon material.

14. The composite material of Claim 13, wherein the carbon material is selected from the group consisting of diamond, graphite, amorphous, nanotubes, and mixtures thereof.

15. The composite material of Claim 1, is a member selected from the group consisting of particle-strengthened forms, fiber-strengthened forms, network-strengthened, and bi-/tri-continuous-strengthened forms.

16. The composite material of Claim 15, wherein the particle-strengthened form is composed of particles in an amount of 1 to 99% by weight based on the total weight of the composite material.

17. The composite material of Claim 16, wherein the particles are selected from the group consisting of metals, ceramics, carbon, silicon, boron, and mixtures thereof.

18. The composite material of Claim 16, wherein the particles are present in a high weight fraction mixture composed of different grades of particles.

19. The composite material of Claim 18 wherein the high weight fraction mixture is composed of particles in the millimeter, micrometer and nanometer ranges.

20. The composite material of Claim 15, wherein the fiber-strengthened form is composed of fibers in an amount of 1 to 99% by weight based on the total weight of the composite material.

21. The composite material of Claim 20, wherein the fibers are selected from the group consisting of carbon, graphite, glass, alumina, silica, silicon carbide, silicon nitride, boron and mixtures thereof.

22. The composite material of Claim 20, wherein the fibers are randomly oriented.

23. The composite material of Claim 20, wherein the fibers are aligned with one another.

24. The composite material of Claim 20, wherein the fibers are arranged to yield a fabric selected from the group consisting of one-, two-, and three-dimensional forms.

25. The composite material of Claim 15, wherein the network-strengthened form is composed of wires in an amount of 1 to 99% by weight based on the total weight of the composite material.

26. The composite material of Claim 25, wherein the wires are randomly oriented.

27. The composite material of Claim 25, wherein the wires are aligned with one another.

28. The composite material of Claim 25, wherein the wires are arranged to yield a structure selected from the group consisting of one dimensional, two dimensional and three dimensional forms.

29. The composite material of Claim 25, wherein the wires are selected from the group consisting of iron, nickel, cobalt, titanium, aluminum, beryllium, copper, silver, gold, platinum, tungsten, molybdenum, uranium, and alloys thereof.

30. The composite material of Claim 15, wherein the bicontinuous-strengthened form consists of a porous matrix phase with open porosity.

31. The composite material of Claim 30, wherein the matrix phase is selected from the group consisting of metals, ceramics, carbon, silicon, boron, and mixtures thereof.

32. The composite material of Claim 31, wherein the metal is selected from the group consisting of iron, nickel, cobalt, titanium, aluminum, beryllium, copper, silver, platinum, tungsten, molybdenum, uranium, and alloys thereof.

33. The composite material of Claim 31, wherein the ceramic is selected from the group consisting of silica, alumina, zirconia, yttria, magnesia, beryllia, titanium carbide, beryllium carbide, boron carbide, boron nitride, silicon carbide, silicon nitride, titanium boride, tungsten carbide, uranium carbide, and combinations thereof.

34. The composite material of Claim 31, wherein carbon is selected from the group consisting of carbonized carbon and graphitized carbon.

35. The composite material of Claim 30, further comprising an interlayer formed from a chemical reaction between the matrix phase and the carbon binder mixture, to yield a tricontinuous-strengthened composite.

36. The composite material of Claim 35, wherein the matrix phase is composed of a carbide forming material.

37. The composite material of Claim 36, wherein the carbide forming material is selected from the group consisting of iron, chromium, titanium, beryllium, tungsten, molybdenum, uranium, silicon, boron, and alloys thereof.

38. A method of making a composite material, said method comprising the steps of:

dispersing a sufficient amount of carbon binder mixture comprising mixed fullerenes into a matrix phase; and

applying sufficient sintering pressure to the carbon binder mixture and the matrix phase at a sintering temperature for a sufficient time to form a nanostructured form of carbon, whereby the composite material is obtained.

39. The method of Claim 38, wherein the dispersing step further comprises applying a sufficient dispersing pressure to the carbon binder mixture at a dispersing temperature to facilitate the dispersal of the carbon binder mixture into the matrix phase.

40. The method of Claim 38, wherein the sintering pressure is at least 0.1 GPa, the sintering temperature of at least 400°C, and the time is at least 100 seconds.

41. The method of Claim 40, wherein the sintering pressure ranges from about 0.1 to 10 GPa, the sintering temperature ranges from about 400°C to 1000°C, and the time ranges from about 100 to 10,000 seconds.

42. The method of Claim 39, wherein the dispersing pressure is at least 0.01 GPa and the dispersing temperature is at least 20°C.

43. The method of Claim 42, wherein the dispersing pressure ranges from about 0.01 to 0.1 GPa, and the dispersing temperature ranges from about 20°C to 400°C.

44. The method of Claim 38, wherein the dispersing step is carried out through either one of mechanical means or chemical means.

45. The method of Claim 38, wherein the carbon binder mixture comprises carbon nanoparticles.

46. The method of Claim 45, wherein the carbon nanoparticles are mixed fullerenes.

47. The method of Claim 46, wherein the carbon binder mixture further comprises hydrocarbons.

48. The method of Claim 38, wherein the carbon binder mixture is present in amounts of from about 1 to 99% by weight based on the total weight of the composite material.

49. The method of Claim 38, wherein the pressure sintering step further comprises reacting the matrix phase with the carbon binder mixture to yield an interlayer therebetween.

50. The method of Claim 49, wherein the composite material is integrally bonded to a substrate selected from the group consisting of metals, ceramics, carbon, silicon, boron, and combinations thereof.

5